

# Announcements

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▣ 1<sup>st</sup> EXAM on *Tuesday, Feb. 14!*

▣ Homework for tomorrow...

Ch. 28: CQ 9, Probs. 26, 30, & 38

CQ3: a) increases, negative PE becomes less negative b) less than, as PE increases, KE decreases

28.12: 11V

28.37: 0.49 m/s

Office hours...

MW 10-11 am

TR 9-10 am

F 12-1 pm

▣ Tutorial Learning Center (TLC) hours:

MTWR 8-6 pm

F 8-11 am, 2-5 pm

Su 1-5 pm

# Chapter 28

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## The Electric Potential

*(The Electric Potential of Many Charges)*

# *Last time...*

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*Electric Potential* of a point charge..

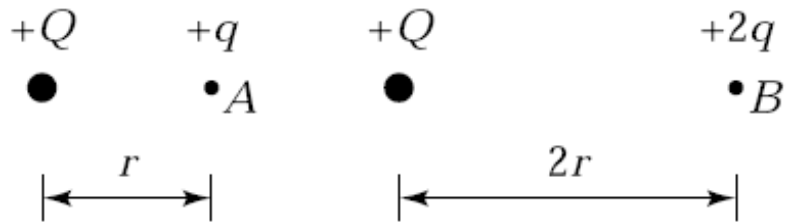
$$V = \frac{Kq}{r}$$

## Quiz Question 1

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Two test charges are brought separately into the vicinity of charge  $+Q$ . First, charge  $+q$  is brought to point  $A$  a distance  $r$  from  $+Q$ . Next,  $+q$  is removed and a charge  $+2q$  is brought to point  $B$  a distance  $2r$  from  $+Q$ .

Compared with the *electric potential* of  $+Q$  at  $A$ , that of  $+Q$  at  $B$  is



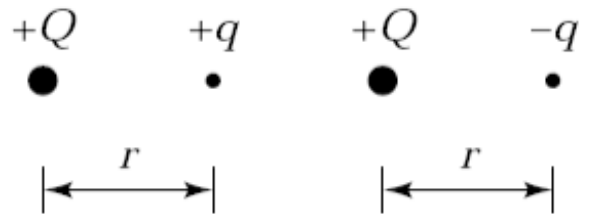
1. greater.
2. smaller.
3. the same.

## Quiz Question 2

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Two test charges are brought separately into the vicinity of charge  $+Q$ . First, charge  $+q$  is brought to a point a distance  $r$  from  $+Q$ . This charge is removed and a charge  $-q$  is brought to the same point.

The *electric potential energy* of which charge ensemble is *greater*:



1.  $+Q$  &  $+q$
2.  $+Q$  &  $-q$
3. It is the same for both.

28.7:

## The Electric Potential of Many Charges

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The *Electric Potential* at a point in space is the sum of the potentials due to each charge...

$$V = \sum_i \frac{K q_i}{r_i}$$

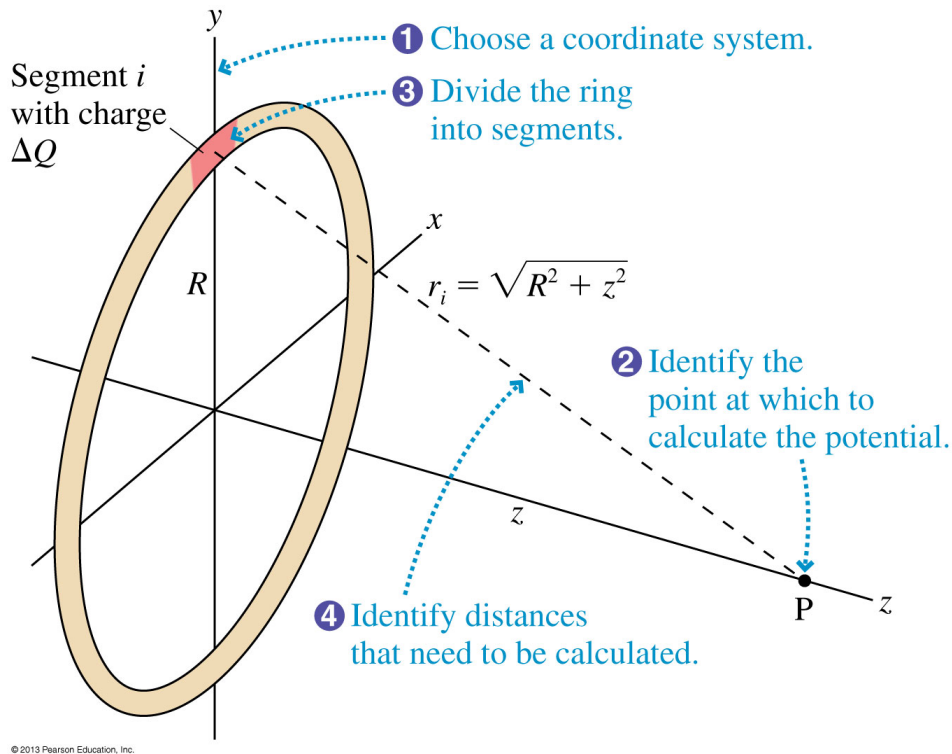
where  $r_i$  is the distance from  $q_i$  to the point in space where the potential is being calculated.

▣ *Electric Potentials* also obey the *Law of Superposition*!

i.e. 28.12:

## The potential of a ring of charge

A thin, uniformly charged ring of radius  $R$  has total charge  $Q$ . Find the potential at distance  $z$  on the axis of the ring.



## Quiz Question 3

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Consider two isolated spherical conductors each having net charge  $Q$ . The spheres have radii  $a$  and  $b$ , where  $b > a$ . Which sphere has the higher potential?

1. The sphere of radius  $a$ .
2. The sphere of radius  $b$ .
3. They have the same potential.



i.e. 28.13:

## The potential of a charged dime

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A 17.5 mm diameter dime is charged to +5.00 nC.

- What is the *potential* of the dime?
- What is the *potential energy* of an electron 1.00 cm above the dime?

